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ABSTRACT

The paper reports on an Australian study comparing two methods of teaching a word recognition reading task to eight mildly retarded adolescents. One method involved incidental learning, while the other involved a more structured paired-associate approach. It was found that all eight Ss learned a short list of tool names equally well under either method of instruction, and that they effectively retained the skill irrespective of the acquisition setting. Some possible reasons for the results are offered. (DLS)

(This is one of a series of reports and working papers concerned with the development and evaluation of programs at the Granville Work Preparation Centre by a Macquarie University Research Team. Details of other reports which are available are found on the back page).

A COMPARISON OF TWO METHODS OF TEACHING A READING TASK TO MILDLY INTELLECTUALLY HANDICAPPED ADOLESCENTS[1,2]

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INTRODUCTION

Recent studies point to the potential effectiveness of intervention programs in improving the cognitive and academic performance of retarded persons up to and beyond the age of adolescence (Feuerstein, 1977; Kirby and Nettelbeck, 1977; Mason, 1978), and are of particular relevance to programs being conducted in facilities such as Work Preparation Centres for the mildly intellectually handicapped.

In these Centres intensive resources have been marshalled to deliver programs designed to improve the trainees' level of functioning in those social, academic and vocational skills which are considered necessary for open employment and for a satisfactory life generally. Of particular interest is the provision of teaching staff whose job it is to continue the general education of those trainees who demonstrate serious inadequacies in academic skills such as reading, number and communication. For one of the most serious problems found by at least one of these Centres is the extremely low level of performance in these skills exhibited by trainees upon entry to the program. Despite at least ten years of schooling, some in special classes, many trainees perform around the Year 1 or 2 level on many of these skills. However, it would seem inappropriate and wasteful to simply replicate the regimen they experienced in the schools in the expectation that in some vague way added maturity may ameliorate the situation.

Therefore, this is one of the problems upon which the attention of the Macquarie University Research Team has been focussed in the course of its research and development activities at the Granville Work Preparation Centre. As outlined earlier (Ward et al, 1977:30), we envisage this pilot centre as an exemplary institution in that it participates in:

a) the construction of high quality generalizable programs;
b) experimentation into the components of effective instruction and care provision;
c) modelling up-to-date practice, particularly in the sense of providing laboratory situations where theory may be seen as translated into practice;

d) serving the normalization principle directly by training other agencies in providing a service;

e) disseminating ideas and results;

f) catering for the most difficult or marginal cases for at least part of their work.

In the light of (c) above, this study will focus particularly upon the development of an efficient and economic strategy to teach word recognition skills.

THE PROBLEM

Extensive research has been conducted into the learning and memory characteristics of retarded persons through experiments involving paired-associate learning, and studies have questioned the stereotyped view of this group as being slower to learn and as having poorer memory than non-retarded individuals. For example, a succession of studies conducted in the late 50's and early 60's indicate that there is little or no difference in the rate of paired-associates learning by retarded and non-retarded Ss matched for either CA or MA. This is well illustrated by the work of Vergason (1964) who investigated retention as a function of the amount of original training. His results indicated that retarded and non-retarded Ss learned the paired-associate task at the same rates. The question was raised as to whether retention was a function of the degree of original learning, and hence one half of the Ss was trained to a minimum criterion using the method of adjusted learning, while the other half was permitted to have additional over-learning trials. A comparison revealed that non-retarded Ss were superior to retarded on retention of the minimum task at one and thirty days, but there were no differences on retention of the overlearned task after thirty days. Therefore, Vergason suggests that retarded persons would benefit from programs which emphasize overlearning in acquisition.

Of more particular interest is a later study by Vergason (1966) who demonstrated that with a group of EMR's an auto instructional paired-associate technique aided the retention of a sight vocabulary to a greater degree than a traditional instructional program. At the conclusion of the instructional phase there were no differences between the two methods for retention on a sample of EMR's, but from one month

through to fourteen months the words learned via the auto instructional technique were retained significantly better than those learned with the traditional program. Vergason suggests that the opportunity for over-learning afforded by the experimental condition possibly facilitated memory functions. Additional support for the usefulness of auto instructional devices as an aid for teaching word recognition and spelling tasks to EMR children is found in the work of Malpass et al (1964); Platt (1965, 1967); and Peach and Lewis (1969).

The present study developed from a pilot experiment designed to test the usefulness of a 3M Sound on Slide projector in teaching a tool recognition task. This machine, fully described by Di Primo (1977) is particularly useful for synchronized slide and sound presentations. Trainees who had difficulty in recognizing tool names watched slides of various tools and attempted to name them. After an interval, a pre-recorded confirmation was given by the instructor, and a peer who accompanied the trainee undergoing instruction recorded correct and incorrect trials. The names of the tools were printed on the check sheet and numbered consecutively 1 to 20. After each trainee completed his trials he reversed roles with his peer. At no time were trainees encouraged to read the name and it was assumed, owing to the difficulty of the words, that the trainee checking the list would simply follow the numerical order of the slides. However, the rather unexpected and intriguing finding was that, in addition to mastering the tool recognition task, most of the trainees had learned to read the names of the tools. It was assumed that this was accomplished incidentally through the checking of peer responses to the recognition tasks. Owing to this finding, it was decided to compare the effectiveness of paired-associate learning to the incidental approach outlined above using a similar design to Vergason (1966).

METHOD

Subjects

8 Ss whose ages ranged from 194 to 215 months with a mean of 204.13 months were selected from among the trainees at the Granville WPC on the basis of their low reading ages. Their full scale Wechsler I.Q's ranged from 54 to 89 with a mean of 70.88 and reading ages (Daniels and Diack) ranged from 5.8 to 8.6 with a mean of 6.87 (Table 1).

Table 1: Sample Characteristics

N	$\bar{x}$ Age Months	$\bar{x}$ WISC I.Q.			$\bar{x}$ Peabody P.V.T.	$\bar{x}$ Reading Age
		V.A.	P.S.	F.S.		
8	204.13	65.5	80.25	70.88	75.63	6.87

Materials

Two lists each of eleven tool names with which Ss were generally unfamiliar were established so that each list was of approximately equal difficulty. Each of the names was printed in black on white cards, 8cm x 30cm, to use at pre and post testing of word recognition.

Equipment included a 3M sound on slide 35mm projector which could be operated automatically. The paired associate items (List 1) each contained two elements; firstly a stimulus element consisting of the printed tool name on a 35mm transparency and a response element consisting of a colour transparency of the tool, its printed name underneath and a recorded confirmation. A blank slide separated each of the eleven paired-associates.

The tool recognition task (List 2)consisted of a stimulus, a 35mm colour transparency of a tool, followed by a recorded confirmation. In addition, the names of List 2 tools were typed in random order on 10 separate sheets for use as check lists for each of the eleven Ss.

List 1 names were: cold chisel, feeler gauge, paint brush, angle grinder, oil stone, mallet, drill sleeve, micrometer, stilson wrench, pinch bar and soldering iron, and List 2 were: wood bit, bolt cutter, nail punch, wire strippers, tin snips, plane, side cutters, wood brace, spirit level, scissors and wood chisel.

Procedure

Each S was pretested on his ability to recognize the printed names of both lists of tools by a random presentation of the white cards using a flash card method. Results were recorded and the Ss were instructed that they were going to learn to read the names of a set of tools (List 1), but they were only expected to recognize the tools in a second set (List 2). All Ss had previous experience with the latter task on a

different set of tools and they were familiar with the operation of the 3M sound on slide projector. Detailed procedures for each list were as follows: List 1: after pressing the "on" button the first stimulus word appeared for 2 secs. The S was instructed to attempt to read the word during that time. The projector would then automatically advance to the next slide which consisted of the word plus a picture of the tool. A recorded instruction said "say its name", followed 3 secs later by "did you say _____?", followed by "say _____". The S then repeated the tool name. A blank slide next appeared after which a new sequence commenced. The slides were randomly arranged for each of the training trials on ten consecutive working days. Each S completed this training in a small room with no other S present. List 2: Ss completed the same number of training trials on this task, but in pairs. One of the pair sat directly in front of the screen and operated the "on"button. The first slide, consisting of a picture of a tool, appeared for 2 secs and the S was instructed to attempt to say its name. This was followed by a recorded question "did you say _____?" followed by "say _____". The projector then automatically advanced to the next slide. The other member of the pair sat to the side of the S receiving instruction and checked on the prepared sheet if the initial response was correct or incorrect by placing a tick or a cross against the words which were numbered in the same order as the slides appeared. Each day the order of the slides was randomly changed. After the first member of the pair completed his eleven slides he changed roles with the other member.

At the conclusion of the ten training trials each S was again tested on the twentytwo word recognition cards. All Ss were tested on the same task at the end of a further 1 week, 4 weeks, 12 weeks and 24 weeks. Care was taken to shuffle the cards into random order and no reference was made to the fact that some had been included in the earlier program.

RESULTS

A sign test analysis (Mendenahll & Ott, 1976) revealed no significant difference ($p > .05$) between Ss' performance on the pretest of Lists 1 and 2, but after 10 training trials post-test results were significantly different ($p < .05$) from the respective pre-test scores. However, again there was no significant difference between the performances on the two

lists. At each subsequent maintenance test the results were significantly different from the respective pre-tests ($p < .05$), but there continued to be no difference between the results on each list. Table 2 contains the mean performance for each list. As Fig. 1 demonstrates, there was little, if any, decrement in performance on either list over the six month's follow-up period.

Table 2: Mean performance of group under two conditions of instruction

Treatment	Pretest	End of Training Period	1 Week	4 Weeks	12 Weeks	24 Weeks
Direct Reading Instruction List 1	3.63[a]	11.0[a]	10.63[a]	10.88[a]	10.38[a]	9.71[a]
Incidental Reading Experience List 2	3.88[b]	9.5[b]	10.25[b]	10.25[b]	10.13[b]	8.86[b]

(a) $p < .05$ (Sign Test)
(b) $p < .05$ (Sign Test)

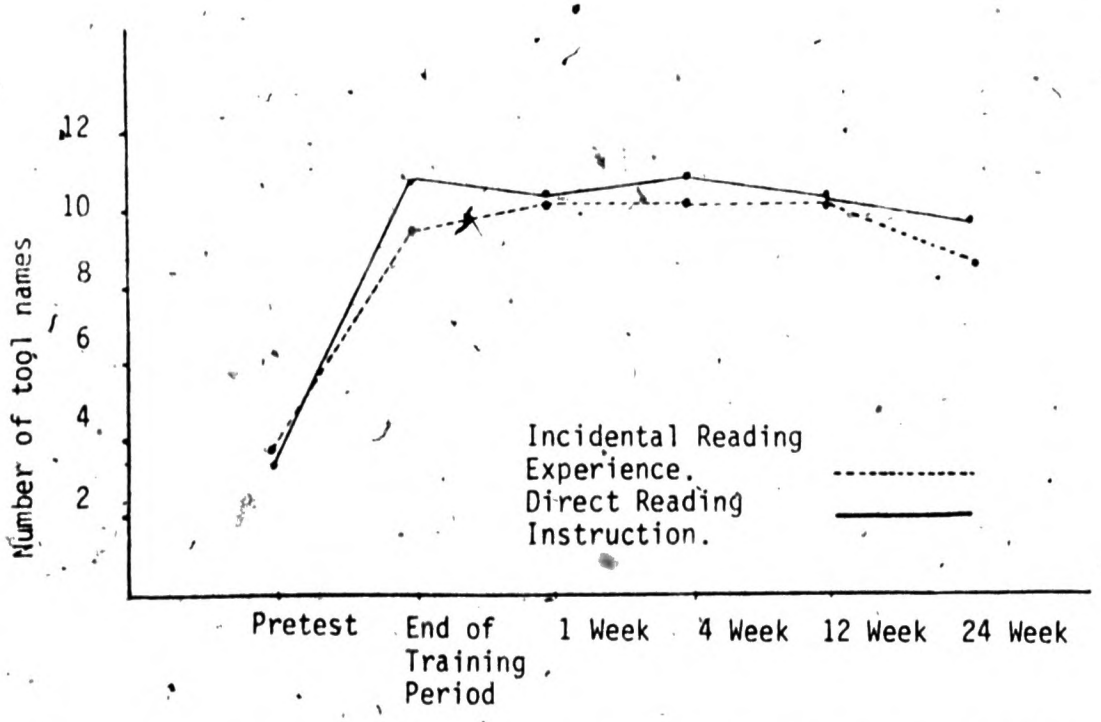

Fig. 1: Mean performance of group under two concurrent conditions of instruction

DISCUSSION

Whereas Vergason (1976) sought to demonstrate experimentally the effectiveness of auto-instruction as an aid for teaching reading skills, this study was designed to compare the relative effects of incidental learning and a more structured paired-associate approach. However, the finding that the 8 Ss learned a short list of words equally well under either method and, furthermore, effectively retained the skill irrespective of the acquisition setting, raises an important question concerning the differences between the conditions under which the respective lists were learned. If, as suspected, the peer checking the responses in the "incidental" setting attended to the printed words as the other S gave his verbal response to the picture of the tool, a paired-associate learning situation was in effect operating. Thus the essential difference between the two methods may have been the instruction that only the tools were to be recognized under the "non reading" situation. Of course, the limited number of tool names to be learned under each condition may have introduced a ceiling effect which could have masked the effects of the methods of instruction on both the acquisition and maintenance stages of the task.

In addition, there were a number of common elements operating under both conditions. Firstly, the use of the sound on slide projector contributed to a high level of attention to the task. Ss were always keen to attend and to participate in this activity and no boredom with the task was evident throughout the course of the experiment. In terms of the attention theory of Zeaman and House (1963), the auto instructional approach may assist the retarded learner to attend to the relevant stimuli so that the formation of associations are facilitated. In a behavioral sense, too, the device encouraged the development of intrinsic reinforcement owing to the way feedback of performance was readily delivered.

Secondly, the strength of the associations formed was possibly enhanced by the nature of the task in that both tasks concerned the learning of tools or tool names. This suggestion is supported by the extensive work which has been conducted into the use of the associated clustering technique. This technique, which is a method for measuring spontaneous organizational strategies during the free recall of verbal materials, consists of the S being presented with a random list of words for several conceptual categories. Despite the random nature of the presentation, Ss tend to organize their recall of the words in conceptual clusters.

Bilsky and Evans (1970) report a number of studies which support the contention that retarded persons have a deficit in their ability to organize input materials. Specifically, Spitz (1966) concludes that clustering ability is directly proportional to intelligence; clustering and recall performance are significantly related, so that techniques which facilitate clustering also improve recall; and clustering performance of retarded persons may be improved by the special organization of the stimulus list or by structuring the response set of the subject. However, studies by Bilsky, Evans and Gilberg (1972) and Evans (1977) report that the facilitative effect of such list organization does not transfer beyond the training material for either retarded or non-retarded subjects. While Bilsky and Evans (1970) are optimistic that it may be possible to increase the effectiveness of organizational skills in retarded persons through the remediation of specific deficiencies in input organization, Gibson and Levin (1975:63) suggest that,

> *... attempts to induce the use of new cognitive structures and strategies by brief experimental intervention are likely to have only a short-lived (if any) effect in promoting efficiency in use of a higher-order structure.*

Nevertheless, Rand et al (1977) have demonstrated with an Instructional Enrichment Program that higher order cognitive structures can be modified so that the retarded learner is capable of selecting and actively organizing the stimuli which impinges on him[1].

A third factor to be considered is the amount of overlearning that Ss accomplished during the 10 trials. Many Ss reached a criterion of one errorless trial early in the training period and subsequent trials afforded an opportunity for overlearning to occur. Thus these opportunities, together with those associated with the brevity of the tasks, may have largely contributed to the results obtained. While Vergason (1968) and Spicker (1966) suggest that overlearning is essential in the case of retarded persons, it would be interesting to determine more precisely the relative effects it has upon the retention of material learned under these conditions, particularly if the amount to be learned was increased.

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1. Work is also in progress at the WPC which suggests that the structuring of verbal instructions may have a generalizable effect on developing problem solving skills (Hauritz, in preparation).

As the results of this study are inconclusive, there are a number of implications which deserve further investigation. It would be useful in the WPC setting to test the effectiveness of auto-instruction versus the more traditional instructor dominated situations. If it can be shown that it affords trainees the opportunity to develop their own learning strategies through more efficient input organization and if their subsequent recall is enhanced, it would appear reasonable to suggest that instructor time could be profitably saved by using auto-instructional devices at each job station. And in any event, if vocational training programs are to generalize to the real world, the learner has ultimately to accept responsibility for his own learning.

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